

WHAT IS CLAIMED IS:

1. An apparatus for coupling a joint of casing to a casing string secured in a well hole of oil or gas well, comprising:

5 a top drive;

a link tilt for securing and hoisting a joint of casing, the link tilt being coupled to the top drive such that the link tilt can pivot about the vertical axis and position the joint of casing above the casing string; and

10 a gripper assembly coupled to the top drive and operable to secure and engage the joint of casing;

wherein the top drive is operable to rotate the gripper head, thereby rotating the joint of casing and coupling the joint of casing to the casing string.

2. The apparatus of claim 1, wherein the gripper assembly comprises a nose sized to fit inside the joint of casing and shaped to guide a stabber-gripper assembly into the joint of casing.

3. The apparatus of claim 1, wherein the gripper head further comprises, a plurality of dies with surface suitable for gripping the outside surface of the joint of casing, wherein the dies are arranged in a radial configuration; and

20 a plurality of hydraulic actuators coupled to the dies wherein the hydraulic actuators may push the dies against the outer surface of the joint of casing such that the gripping member grips the joint of casing.

25 4. The apparatus of claim 1, wherein the gripper assembly is coupled to a rotary manifold that includes a plurality of channels capable of delivering fluid to the gripper assembly while the gripper assembly is rotating.

5. The apparatus of claim 1, further comprising a drive shaft coupled between the top drive and the gripper assembly, the drive shaft transmitting rotational force from the top drive to the gripper assembly.

5 6. The apparatus of claim 5, wherein the drive shaft comprises,  
a telescoping module capable of compensating for movement of the drive shaft  
along the vertical axis during the coupling of the casing to the casing string by the rotation of  
the gripper assembly; and  
a knuckle joint that compensates for misalignment of the gripper head and the  
10 drive shaft during rotation of the drive shaft.

7. The apparatus of claim 1 wherein the operation of the gripper assembly and the link tilt can be remotely controlled.

15 8. The apparatus of claim 1, wherein the gripper head comprises a sealing member to form a seal to allow fluids to be pumped into the casing.

9. The apparatus of claim 8, wherein the sealing member is a self-energizing seal.

20 10. The apparatus of claim 8, wherein the sealing member is remotely actuated to establish or release the seal.

11. The apparatus of claim 8, wherein the stabber-gripper assembly further comprises a remotely actuated air vent valve to release air from the casing.

12. An apparatus to be coupled to the drive shaft of a top drive for remotely rotating and torquing a joint of casing into a casing string comprising one or more joints of casing secured in an oil or gas well, comprising

5 a casing make-up assembly coupled to the drive shaft of the top drive such that the casing make-up assembly can be rotated by the top drive; and

a gripper assembly, comprising a gripping member capable of gripping a joint of casing such that when the gripper assembly is rotated by the top drive, the gripped joint of casing can be coupled to a casing string.

10 13. The apparatus of claim 12, wherein the gripper assembly further comprises a nose sized to fit inside the joint of casing and shaped to guide the gripper assembly into the joint of casing.

14. The apparatus of claim 12, wherein the gripper assembly comprises,  
15 a plurality of dies with a surface suitable for gripping the outside surface of the joint of casing, wherein the dies are arranged in a radial configuration; and

a plurality of hydraulic actuators coupled to the dies, wherein the hydraulic actuators are operable to push the dies against the outer surface of the joint of casing such that the gripping assembly grips the joint of casing.

20 15. The apparatus of claim 14, wherein the gripper assembly is coupled to a rotary manifold comprising a plurality of channels capable of delivering hydraulic fluid or air to the gripper assembly while the gripper assembly is rotating.

25 16. The apparatus of claim 12, wherein the gripper assembly further comprises a sealing member capable of creating a seal to allow fluids to be pumped into the joint of casing.

17. The apparatus of claim 16, wherein the sealing member is remotely actuated to establish or release the seal.

18. The apparatus of claim 16, wherein the sealing member is self-energizing.

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19. The apparatus of claim 18, wherein the gripper assembly further comprises a remotely actuated air vent to regulate the flow of air through the casing.

20. The apparatus of claim 18, further comprising a telescoping module, wherein  
10 the telescoping module is remotely actuated to retract or extend the gripper assembly and thereby displace the sealing member in order to release or establish a seal.

21. The apparatus of claim 12, further comprising a telescoping module capable of compensating for or dampening any movement of the drive shaft along the vertical axis while  
15 the joint of casing and the casing string are being coupled together by the rotation of the gripper assembly.

22. The apparatus of claim 12, further comprising one or more knuckle joints, wherein the knuckle joints are remotely actuated to allow for any offset of the casing string  
20 from the vertical axis of the drive shaft.

23. An apparatus for hoisting and positioning a joint of casing, comprising:  
a top drive system, comprising.

a lifting elevator, wherein the lifting elevator is capable of being  
coupled to a casing string comprising a plurality of joints of casing, such that the top drive  
5 system can hoist the casing string;

a transfer elevator, wherein the transfer elevator is capable of coupling  
to a joint of casing such that the top drive system can hoist the joint of casing;

a handler operatively coupled to the transfer elevator to rotate the  
transfer elevator along a horizontal plane;

10 a link tilt comprising one or more hydraulic actuators wherein the link tilt is  
coupled to the transfer elevator such that the extension or retraction of the hydraulic actuators  
can pivot the transfer elevator about a point located on a vertical axis.

24. The apparatus of claim 23 wherein the handler and the hydraulic actuators can  
15 be remotely controlled.

25. A method for hoisting a joint of casing, positioning the joint of casing above a casing string, and stabbing the joint of casing into the casing string such that the joint of casing is coupled with the casing string, comprising the steps of:

providing a top drive system, the top drive system comprising,

5 a lifting elevator able to be clamped around the casing string for the purpose of hoisting the casing string;

a transfer elevator able to be clamped around the joint of casing for the purpose of hoisting a joint of casing;

a drive shaft;

10 a drive to rotate the drive shaft;

a handler able to rotate the lifting elevator and the transfer elevator in a horizontal plane;

a link tilt comprising one or more hydraulic actuators, wherein the link tilt is coupled to the transfer elevator such that the extension or retraction of the hydraulic  
15 actuators can pivot the transfer elevator about a point located on a vertical axis;

providing a casing make-up assembly coupled to the drive shaft, the casing make-up assembly comprising,

a gripper head, the gripper head comprising,

a nose sized to be inserted in the joint of casing;

20 a gripping member to clamp around the joint of casing;

clamping the transfer elevator around a joint of casing;

hoisting the joint of casing above the casing string;

positioning the joint of casing directly above the casing string by pivoting and rotating the transfer elevator;

25 lowering the joint of casing until it rests on the casing string;

lowering the gripper head until the nose is inserted in the joint of casing;

unclamping the transfer elevator;

positioning the lifting elevator using the link tilt until thread alignment is achieved;

clamping the gripping member around the joint of casing; and  
rotating the drive shaft, thereby rotating the gripper head and joint of casing  
such that the joint of casing is coupled to the casing string.

5           26.    The method of claim 25 wherein the step of positioning the joint of casing  
directly above the casing string by pivoting and rotating the transfer elevator is performed by  
remote control.

10           27.    The method of claim 25, wherein the position of the link tilt and lifting  
elevator at the time of the alignment of the joint of casing and the casing string is saved to  
memory such that the position of the link tilt and the lifting elevator is the same for successive  
joints of casing to be coupled to the casing string.